

### **REMARKS/ARGUMENTS**

Applicants respectfully request reconsideration of this application in view of the foregoing amendments to the claims and the following comments.

#### **Restriction Requirement**

In the Office Action mailed May 26, 2006, the application was restricted to one the following two identified inventions:

- I. Claims 1-27, drawn to “hollow fiber membrane modules.”
- II. Claims 28-32, drawn to “a method for fabricating a membrane.”

Applicants note that the Examiner’s characterizations of claims 1-27 and claims 28-32 are incorrect. Claims 1-27 actually are drawn to an *apparatus incorporating* hollow fiber membrane modules, and not to the modules, themselves; claims 28-32 actually are drawn to a method for fabricating a hollow fiber membrane *module*, and not to a method for fabricating a membrane, by itself.

Nevertheless, Applicants hereby confirm their prior oral election of invention I, covered by claims 1-27. Claims 28-32 have now been canceled, without prejudice. Applicants, of course, reserve the right to file a divisional patent application directed to invention II.

#### **Summary of Office Action and Responsive Claim Amendments**

Also in the Office Action, claims 1-11, 16-18, and 25-27 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 5,104,535 to Cote et al. (the “Cote patent”) in view of U.S. Patent No. 5,352,361 to Prasad et al. (the “Prasad patent”). Applicants respectfully traverse this rejection for the reasons set forth below. Applicants note with appreciation the indicated *allowability* of claims 12-15 and 19-20, if rewritten in independent form, and the indicated *allowance* of claims 21-24.

By this Amendment, Applicants have rewritten *allowable* dependent claims 12 and 13 in independent form, incorporating all of the features previously set forth in their parent

claims 1, 5, and 11. Claims 12 and 13, and their dependent claims 14 and 15, should now be allowed without the need for further substantive examination.

Also by this Amendment, Applicants have amended *allowed* independent claim 21, to delete an inadvertent inclusion of an extra term “and.” Independent claim 21 and its dependent claims 22-24 should remain allowed.

Also by this Amendment, Applicants have amended independent claim 1 to define the invention with greater particularity and thereby to distinguish more clearly over the cited Cote and Prasad patents. Applicants also have canceled dependent claim 2 and amended many of remaining dependent claims 3-11 and 15-20, for consistency with their amended parent claim(s). Claim 25 has been canceled, without prejudice, because it is deemed similar in scope to amended independent claim 1. Applicants also have amended claims 26 and 27 to depend from independent claim 1.

Thus, 25 claims are presented for reconsideration, including amended independent claim 1 and its dependent claims 3-11, 16-20, and 26-27; allowable amended independent claim 12; allowable independent claim 13 and its dependent claims 14-15; and allowable independent claim 21 and its dependent claims 22-24. All of these claims should now be allowed.

#### **The Rejection of Claims under 35 U.S.C. § 103(a)**

Applicants present the following comments regarding the § 103(a) rejection of claims based on the Cote and Prasad patents. Independent claim 1 is directed to an apparatus for modifying the concentration of a predetermined substance present in a first fluid flowing through a conduit. The apparatus includes first and second pluralities of hollow fiber membrane modules located within the conduit, wherein each module includes a plurality of elongated hollow fiber membranes arranged in adjacent, parallel relationship and further includes a membrane housing that supports the elongated membranes with their ends in a prescribed configuration such that a transverse flow path is defined past the membranes' outer surfaces. The first plurality of modules are defined to be mated with each other and aligned along the conduit's longitudinal axis, and the second plurality of modules likewise are defined to be mated with each other and aligned along the conduit's longitudinal axis, downstream of the first plurality of modules.

Independent claim 1 further defines the apparatus to include a baffle assembly that directs the first fluid to flow “initially to the first plurality of . . . modules, where the fluid flows along parallel flow paths simultaneously through such modules, and thereafter along a common path to the second plurality of . . . modules, where the fluid flows along parallel flow paths simultaneously through such modules, wherein in each case the fluid flows through the module along the transverse flow path [defined in such module].” A fluid source also is included, for directing a second fluid to flow through the hollow fiber membranes of each module, such that a predetermined substance is transmitted through the membranes to modify the concentration of the substance in the first fluid.

In rejecting independent claim 1, the Examiner asserted as follows regarding the primary Cote patent:

Cote et al disclose mating or [sic] contiguous membrane modules or stacks arranged in series, each containing hollow fiber membranes, all within a housing or conduit (figures 4 and 5 and corresponding text of column 11, line 42-column 12, line 34), with a 1<sup>st</sup> fluid being fed into the membranes by feed or inlet, and a 2<sup>nd</sup> fluid being fed from a source that flows transverse to the membranes or membrane modules to allow transfer of material from 1<sup>st</sup> to 2<sup>nd</sup> fluid so as to modify the concentration of substance in the 1<sup>st</sup> or 2<sup>nd</sup> fluid (see especially column 11, lines 42-55).

Applicants acknowledge that the Cote patent does, in fact, disclose an apparatus for modifying the concentration of a predetermined substance present in a fluid flowing through a conduit, in which the apparatus incorporates a plurality of hollow fiber membrane modules. However, the arrangement of Cote’s modules differs substantially from that of the apparatus of Applicants’ claimed invention.

The Examiner identified FIGS. 4 and 5 of the Cote patent as being particularly relevant to Applicants’ claimed invention. FIG. 4 of the patent depicts a conduit containing a plurality of *contiguous* hollow fiber membrane modules aligned along the conduit’s longitudinal axis and configured such that the fluid flowing through the conduit flows *sequentially* through the modules. FIG. 5 of the patent depicts a similar apparatus, but in which the plurality of *contiguous* hollow fiber membrane modules are arranged in a 2x2xN array along the conduit’s axis such that the fluid flows along four parallel paths, each path passing *sequentially* through N

successive modules. The FIG. 5 embodiment requires the conduit to be equipped with an enlarged housing having a square cross-sectional shape.

The identified embodiments of FIGS. 4 and 5 of the Cote patent both lack the following element called for by Applicants' amended independent claim 1:

a baffle assembly located within the conduit and configured to direct the flow of the first fluid initially to the first plurality of hollow fiber membrane modules, where the fluid flows along parallel flow paths simultaneously through such modules, and thereafter along a common path to the second plurality of hollow fiber membrane modules, where the fluid flows along parallel flow paths simultaneously through such modules, wherein in each case the fluid flows through the module along the transverse flow path past the exterior surfaces of the plurality of elongated hollow fiber membranes;

This recited baffle assembly is defined to initially direct the conduit fluid to the first set of modules, where the fluid flows through those modules along *parallel* paths, i.e., not along a serial path sequentially through those modules. Thereafter, the baffle assembly directs the fluid to flow along a *common* path to the second set of modules, where again the fluid flows through those modules along *parallel* paths, i.e., not along a serial path sequentially through those modules.

FIG. 7 of Applicants' disclosure helps illuminate this recited function of the baffle assembly. It will be noted in FIG. 7 that the flow diversion assemblies 284 and 286 direct the conduit fluid to flow toward the hollow fiber membrane modules 268-274, where the flow diverters 116 direct the fluid to pass transversely through the elongated hollow fiber membranes 102 of these modules 268-274. Thereafter, the flow diversion assemblies 286 and 288 direct the fluid discharged from the modules 268-274 toward the modules 276-282, where the flow diverters 116 direct the fluid to pass transversely through the elongated hollow fiber membranes 102 of these modules 276-282. Finally, the flow diversion assembly 284 directs the fluid discharged from the modules 276-282 to travel further down the conduit.

A corresponding baffle assembly is entirely lacking in all of the embodiments disclosed in the Cote patent. Indeed, the Examiner tacitly acknowledged this deficiency of the Cote patent by relying on the secondary Prasad patent for a disclosure of a baffle assembly that

directs a fluid to flow transversely past the exterior surfaces of a plurality of hollow fiber membranes. The Examiner asserted it “would have been obvious . . . to have utilized the baffle of Prasad in the apparatus configuration of Cote et al, in order to prevent premature mixing of the permeate and the material-receiving fluid.”

Applicants do not understand the Examiner’s comment about “premature mixing.” Nevertheless, they disagree that it would have been obvious to have incorporated Prasad’s baffle assembly into Cote’s apparatus. Cote’s plurality of hollow fiber modules all are arranged in a tight, contiguous relationship such that the fluid flows linearly down the conduit. What would be the technical motivation for modifying this linear flow path? What would be the technical motivation for disrupting the tight, contiguous relationship of Cote’s modules to place a baffle system between and adjacent to the modules? Where would the baffles be placed? The Prasad patent fails to provide any answers to these relevant questions.

Further, Applicants note that, in *all* of embodiments disclosed in the Prasad patent, the baffle assembly directs the fluid flow back and forth across the *same* hollow fiber membranes. Nowhere is it suggested that a baffle assembly be provided for directing fluid flow between separate hollow fiber modules, as in Applicants’ claimed invention. Thus, even if Cote’s apparatus were to be modified to incorporate Prasad’s baffle assembly, the so-modified apparatus still would lack any structure for directing fluid flow *between* the modules.

Moreover, even assuming *arguendo* that it might have been obvious to have incorporated a baffle assembly of some kind into the apparatus of the Cote patent, it certainly is not the case that it would have been obvious to have arranged Cote’s modules into two separate groups and to have configured the hypothetical baffle assembly to initially to direct the fluid to the first set of modules, where it flows through those modules along *parallel* paths (i.e., not along a serial path sequentially through those modules), and thereafter to direct the fluid to flow along a *common* path to the second set of modules, where again it flows through those modules along *parallel* paths (i.e., not along a serial path sequentially through those modules), all as called for in amended independent claim 1.

For these reasons, the § 103(a) rejection of independent claim 1, as amended, is improper and should be withdrawn.

Rejected claims 2-11, 16-18, and 26-27 all depend from amended independent claim 1, adding structural features that further distinguish over the cited Cote and Prasad patents. For this reason, and for the reasons set forth above with respect to independent claim 1, the rejection of these dependent claims is improper and should now be withdrawn.

#### **Amendment to the Title of the Invention**

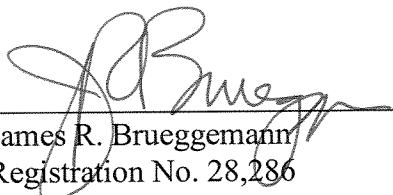
By this Amendment, Applicants have amended the Title of the Invention to reflect their response to the restriction requirement, which canceled method claims 28-32. The amended Title of the Invention now correctly refers only to the subject matter of the claims under examination.

#### **Conclusion**

This application should now be in condition for a favorable action. Issuance of a notice of allowance is respectfully requested. If the Examiner believes that a telephone conference with Applicants' undersigned attorney of record might expedite the prosecution of this application, he is invited to call at the telephone number indicated below.

Respectfully submitted,

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